

# Nanostructured Dielectrics for High-Temperature Capacitors, Phase I

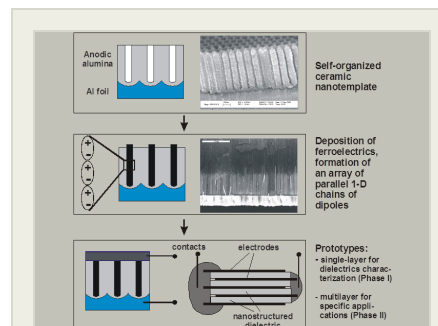
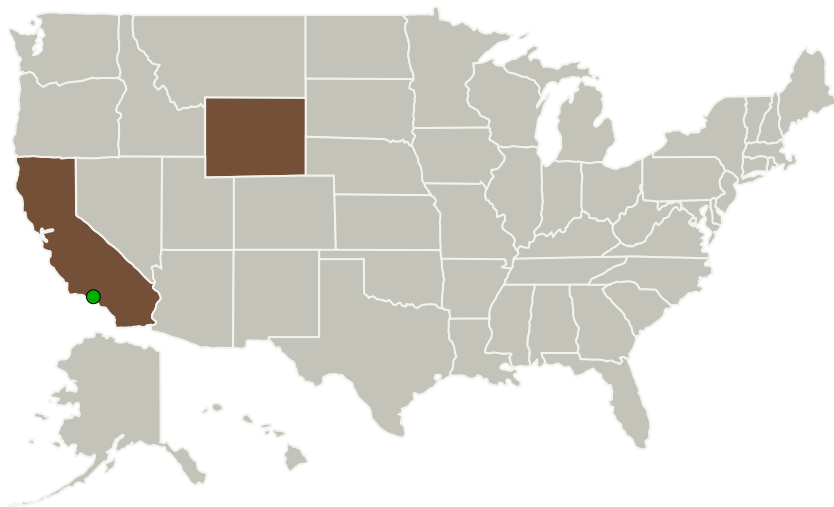
Completed Technology Project (2016 - 2016)



## Project Introduction

Space operation places extra physical and structural demands on the power components, including capacitors. Nanostructured dielectrics offer the opportunity to tailor the dielectric material on the nanometer scale to provide tremendous improvements in electrical, mechanical, and thermal properties, and enable high-temperature, high-energy-density, and high-voltage capacitors. In this project, the team of Thermosolv and Arizona State University targets the development of novel ceramic dielectrics with the unique nanostructured architecture comprised of closely packed parallel one-dimensional chains of dipoles. The proposed structure will realize dramatic enhancements in dielectric constant (by orders of magnitude) in comparison with conventional dielectrics, while preserving high voltage breakthrough strength and low dielectric losses. Such a large leap in performance, in combination with the robust, reproducible, and manufacturable structure, will enable high-energy-density, high-power, thermally stable, and long-lived capacitors for energy storage and power conditioning. Phase I work will demonstrate feasibility of the technology by fabricating and testing capacitor prototypes utilizing novel nanodielectrics.

## Primary U.S. Work Locations and Key Partners



Nanostructured dielectrics for high-temperature capacitors, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

## Nanostructured Dielectrics for High-Temperature Capacitors, Phase I



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Organizations Performing Work	Role	Type	Location
Thermosolv, LLC	Lead Organization	Industry	Laramie, Wyoming
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California	Wyoming
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## Project Transitions

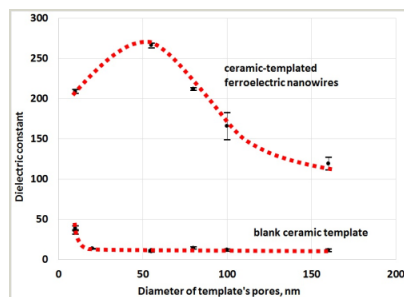
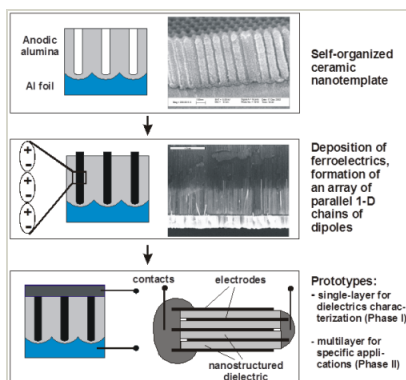
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140073>)

## Images



## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Thermosolv, LLC

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

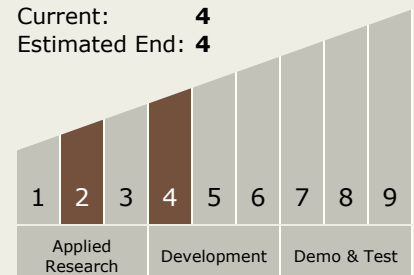
Carlos Torrez

## Principal Investigator:

Oleg Polyakov

## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4



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## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.3 Power Management and Distribution
    - └ TX03.3.1 Management and Control

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System